REMARKS

Claims 1-2, 4-6 and 12-13 are pending in this application. By this Amendment, claim 5 is amended, claims 7-11 are cancelled and claims 12-13 are added. No new matter is added.

I. Claim Rejections

The Office Action (i) rejects claims 1-2, 4 and 10-11 under 35 U.S.C. §103(a) over U.S. Patent 6,801,220 to Greier, et al. (Greier) in view of U.S. Patent 5,886,682 to Biggs, and further in view of U.S. Patent 5,877,737 to Kim et al. (Kim); and (ii) rejects claims 5-9 under 35 U.S.C. §103(a) over Greier in view of Biggs. Applicants respectfully traverse the rejections.

By this Amendment, claims 7-11 are cancelled, thus the rejections as to these claims are moot.

As will be explained below, the claims are patentable because (i) there is no motivation to combine the references to result in Applicants' claims, (ii) the Office Action's proposed modifications of the references is contrary to the teachings of the references, i.e., the references are incompatible, and (iii) all claimed features are not disclosed in the references.

Greier discloses adjusting intensities of subpixels based on the luminance characteristics and initial intensity values of the subpixels in order to shift the subpixel intensity values from mid-tone levels, which provide non-ideal viewing angle and color characteristics, to either bright or dark intensity levels (col. 4, lines 62-66), which have improved viewing angle characteristics. This adjustment is done by pixel groups with average luminance preserved in local areas (col. 12, line 61 to col. 13, line 4). Various patterns for processing pixels to shift the intensity levels are disclosed by Greier (Figs. 15-21). Most patterns are generated by <u>processing two adjacent pixels in the same row</u>. The other patterns are generated by <u>using pixels from adjacent rows</u> (Fig. 15; col. 14,

lines 49-59). Algorithms for determining the patterns are given in Figs. 22 and 23. Greier does not disclose changing image size. Thus Greier discloses adjusting the grayscale levels of pixels and subpixels when the input image is the same size as the displayed image.

Biggs discloses a method for enlarging a bitmap by a non-integer multiple by duplicating pixels in the bitmap (see Figs. 4a-4b; col. 3, lines 51-63).

Kim discloses a wide viewing angle driving circuit 31 that operates in cooperation with gate driver 33 and upper and lower source drivers 32 and 35. Wide viewing angle driving circuit 31 includes first gray level voltage generator 301 and second gray level voltage generator 302, which generate sets of first and second grayscale voltages, respectively, from electrical sources V and V', respectively (Figs. 5a and 5b; col. 3, lines 10-33). Each of the gray level voltage generators 301 and 302 has a plurality of resistors, such as R0-Rn+1 for the first gray level generator 301 (Fig. 5a), connected in series (resistor change).

The plurality of resistors are supplied the maximum or minimum grayscale voltages, electrical sources V and V', respectively, and they output a scaled set of grayscale voltages (col. 2, line 62 to col. 3, line 3). An analog distributor 303 receives the gray scale voltages from the first and second gray level voltage generators 301 and 302 and provides these values to upper and lower source drivers 32 and 35 (Fig. 3). The upper source driver 32 and the lower source driver 35 are connected to multiple data lines 33 (Fig. 3; col. 3, line 54 to col. 4, line 7). Each pixel is connected to a data line 33 (Fig. 3).

The first grayscale voltages are applied to a first set of pixels to achieve a first viewing angle characteristic and the second gray level voltages are applied to a second set of pixels to achieve a second viewing angle characteristic, the sets of pixels to which the grayscale voltages are applied being controlled by control signals A and B (col. 3, lines 3-9). While the first and second sets of pixels can be in various relationships, such as a checkerboard pattern as shown in Fig. 1A (col. 4, line 65 to col. 5, line 3), Kim discloses that the various scaled

voltages produced by the resistor chains from electrical sources V and V' are each applied successively to <u>pixels spaced vertically across the whole display</u> (Figs. 3 and 5).

In order to implement the disclosure of Kim in an LC display, the peripheral driving circuits of the LC display would need to be modified (abstract, see also Fig. 3, the upper source driver 32 and lower source driver 35). Kim does <u>not</u> disclose setting the grayscale of the first and second sets of pixels to achieve a -30 degree or a +30 degree viewing angle characteristic.

In operation, the electrical voltages V and V', which are supplied to first and second gray level voltage generators 301 and 302, respectively, are the grayscale values for one of the pixels on the "upper" and "lower" circuits, respectively. The first and second gray level voltage generators 301 and 302 then scale the input grayscale voltages by their resistor chains. Thus, the receiving pixels that are at the top of the panel and the bottom of the panel, respectively, are driven at maximum brightness, and the receiving pixels that are at the bottom of the panel and at the top of the panel, respectively, are driven at minimum brightness. All the other pixels in between are proportionally driven as determined by the corresponding resistor chain of the first and second gray level voltage generators 301 and 302.

Thus, Kim divides all of the pixels of a liquid crystal display (LCD) into two groups, each group of pixels alternately being driven such that their brightnesses vary, decreasing from a maximum for pixels at the top of the LCD (for pixels driven by the upper source drive 32) and pixels at the bottom of the LCD (for pixels driven by the lower source driver 35), to a minimum for pixels at the bottom of the LCD (for pixels driven by the upper source drive 32) and pixels at the top of the LCD (for pixels driven by the lower source driver 35). Each pixel successively farther away from the corresponding source driver is driven at a successively lower level of brightness, predetermined by the resistors R0-Rn+1 (for the "upper" driven pixels) and R0'-Rn+1' (for the "lower" driven pixels).

Regarding independent claim 1, the Office Action states that the disclosure of Kim can be combined with the device of Greier in order to widen the viewing angle (page 6). However, Greier already is directed to a method of widening the viewing angle of an LCD. Thus, one of ordinary skill in the art would not have been motivated to modify Greier because Greier already has this characteristic.

Further, the Office Action cites to Kim in relation to the claimed +30 degree and -30 degree viewing angle features and alleges that it would have been obvious to use these values in order to widen the viewing angle (page 6). However, the Office Action is impermissibly reading into Kim something that is not there. Kim clearly discloses the generation of pixel voltages "to produce a first viewing angle characteristic" and "to produce a second viewing angle characteristic" (col. 2, lines 13-23). Kim does not disclose the recited values of +30 degrees and -30 degrees and does not disclose a range for viewing angles which includes +30 degrees and -30 degrees. Relative to the claims, Kim adds nothing to what Greier already discloses - that a wider viewing angle characteristic can be achieved by changing the pixel driving voltages. Thus, Kim fails to cure the deficiencies of Greier.

Further, Kim and Greier are not combinable because they are incompatible. This is because both Greier and Kim disclose modifying voltages provided to different pixels, but the constraints used to define the relative voltages of the different pixels are different for each reference. Thus, to modify Greier by the disclosure of Kim as suggested by the Office Action would require Greier's method of determining pixel voltages to be replaced by that of Kim. Further, Greier and Kim define different groupings of pixels to be modified relative to each other.

Greier discloses adjusting intensity for a local group of two to four pixels based on the average intensity of the pixel group (col. 14, lines 49-59; col. 12, line 63 to col. 13, line 1). Kim discloses varying the brightness of pixels based solely on the location of the pixel on the

LCD (col. 4, lines 29-33). Thus, modifying Greier by the grayscale values as determined by Kim, as proposed by the Office Action, would render the device of Greier inoperable for its intended purpose. That is, Greier's disclosed methods of calculating luminescence values across adjacent pixel pairs would be replaced by Kim's first and second gray scale voltage generators 301 and 302 having their fixed resister chains to determine voltages as a successively decreasing chain of voltages. That is, modifying Greier to include the disclosure of Kim would destroy the system of Greier, replacing it with that of Kim.

Further, Greier discloses a method to improve viewing angle by reducing the intensity of mid tone levels (paragraph spanning col. 4 and 5). However, if the system of Greier is modified with the disclosure of Kim as suggested, then the intensity values at mid tone levels would be increased as a result of the operation of the resistor patterns of Kim. This results from Kim's resistor chain which sets grayscale values for pixel groups - thus it could be said, for a given group of pixels driven by voltages from the same data line 33, that 1/3 of the pixels in a group receive high intensities (values equal to or above 66% of the electric source V or V'), 1/3 receive low intensities (values equal to or below 33% of the electric source V or V'), and 1/3 receive mid level intensities (values equal to or between 33% and 66% of the electric source V or V'), the last of which is what Greier is dedicated to avoiding. In this manner, Greier's intended goal of reducing mid tone intensities would be thwarted. Thus, again, modifying Greier as proposed by the Office Action would render Greier's system unsuitable for its intended purpose.

Further, if the system of Greier is modified as disclosed by Kim as proposed, because Kim discloses reducing voltages (as a result of the resister chains) applied to all but the first pixel in each grouping, the modified system of Greier would have an overall reduced intensity and brightness. Thus, the proposed combination would result in Greier's system being modified to be unsuitable for its intended purpose of providing a useable display.

Nevertheless, even if the applied references are combined as suggested, the proposed combination fails to disclose "the viewing angle range adjustment device sets grayscale value of one of the adjacent pixels based on display characteristics of a -30 degrees observation direction and sets grayscale value of the other one of the adjacent pixels based on display characteristics of a +30 degrees observation direction" as discussed above.

Regarding independent claim 5, claim 5 is amended by this Amendment to clarify that the viewing angle adjustment device sets different grayscale values to the same color sub pixels of three different pixels. Support for this amendment can be found, for example, in Fig. 3.

The proposed combination fails to disclose "the viewing angle range adjustment device sets different grayscale values for the same color sub pixels of the first, second, and third pixels." The applied references fail to disclose this because Greier shows different grayscale values for the same color sub pixels of only two different pixels (Fig. 20).

For the foregoing reasons, Applicants respectfully request withdrawal of the rejections.

II. <u>Conclusion</u>

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

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